

13. SOMATERIA V-NIGRUM.

One of eight eggs taken near St. Michael's, Norton Sound. It is smooth and of a pale olive-green, measuring 2.4 in. \times 1.67 in.

14. CHEN HYPERBOREUS.

From the Arctic coast, eastward of the Anderson River. It is of a warm yellowish-white, but much obscured by dirt, and measures 2.93 in. \times 2.09 in.

EXPLANATION OF PLATE IV.

- Fig. 1. Egg of *Numenius borealis*, p. 56.
 2. " *Calidris arenaria*, p. 56.
 3. " *Numenius hudsonicus*, p. 57.
 4. " *Larus franklini*, p. 57.
 5. " *Xema sabinii*, p. 57.
 6. " *Chroicocephalus philadelphia*, p. 57.
 7. " *Chionis minor*, p. 57.
 8. " *Theristicus melanopsis*, p. 56.

4. On *Hemicentetes*, a new Genus of Insectivora, with some Additional Remarks on the Osteology of that Order. By ST. GEORGE MIVART, F.R.S.

[Received January 17, 1871.]

(Plate V.)

HEMICENTETES MADAGASCARIENSIS.

Erinaceus madagascariensis, Shaw, Gen. Zool. i. 2. p. 458.

Erinaceus ecaudatus, Schreber, iii. p. 584, tab. 165*.

Erinaceus semispinosus, Cuvier, Règ. An. 1st edition, p. 136.

Setiger variegatus, Geoff. St.-Hilaire, Nouv. Dict. xxxii. p. 54.

Centenes semispinosus, Cuvier, Règne Anim. i. p. 125; Desmarest, Mamm. p. 162. no. 253.

Centetes semispinosus, Fischer's Synopsis, p. 245. no. 3; Isid. Geoff. St.-Hilaire, Dict. Class. xvi. p. 41, and Magasin de Zoologie, 1839, pp. 15 and 32; Wagner, J. A. Schreb. Supplem. ii. pp. 35 and 553, and v. p. 583.

Centetes madagascariensis, Gray, Mag. Nat. Hist. 1836, and List of Mammalia in Brit. Mus. 1843, p. 82.

Le jeune Tanrec, Buffon, Hist. Nat. Suppl. iii. p. 214, tab. xxxvii.; Sonnerat, Voyage à la Chine, tom. ii. p. 146.

Asiatic Hedgehog, Pennant's Quadrupeds, ii. p. 236.

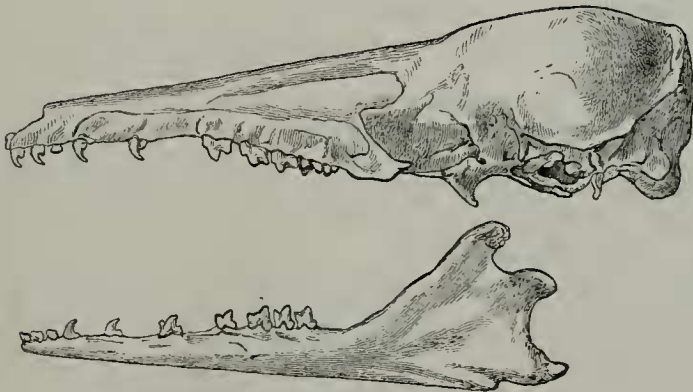
The curious insectivore the osteology of which is now, I believe, for the first time described, has been very long known, having been well figured by Buffon in 1776. Nevertheless it was considered by M. Isidore Geoffroy St.-Hilaire a species determined from imma-

ture specimens only *. Recently both our National Collection and the Museum of the Royal College of Surgeons have been enriched by skeletons of this species, and a very perfect and fully adult specimen in the possession of Mr. E. Gerrard has been very kindly lent me for description and to supply the figures herewith given.

These specimens have convinced me that the differences between the species now described and *Centetes ecaudatus* are of sufficient importance to warrant the elevation of the former into a distinct genus.

The external characters are so well known already that I shall confine myself to a description of the skeleton and dentition, pointing out the resemblances and differences between these parts in *Hemicentetes* and in *Centetes*†.

Fig. 1.



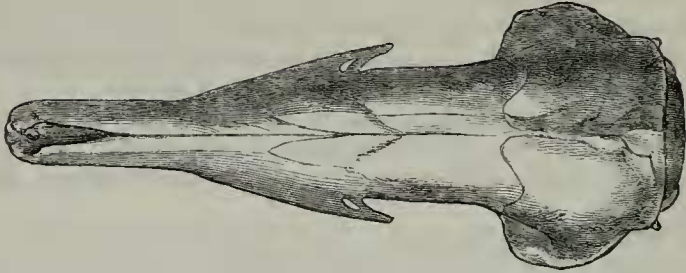
Side view of skull, twice the natural size.

The skull is even more produced than is that of *Centetes*, but it is more tapering, more so, indeed, than in any insectivore, even *Talpa*. Thus, when looked at from above, it is much less cylindrical than in *Centetes*; and even when viewed laterally, it is at least as conical from behind forwards, in spite of the absence of the sagittal ridge which is so strongly marked in *Centetes*. The skull is broadest between the glenoidal surfaces, and then tapers forwards with considerable regularity. The orbits are not only incomplete behind, but there is not even any trace of a postfrontal process. Posteriorly the skull is rounded; but anteriorly the nares slope gently backwards, with a very elongated opening. There is no zygomatic arch, but the maxillary process projects more backwards and less outwards than in *Centetes*; it ends in a sharp, rather upwardly inclined point.

* He says, in 'Magasin de Zoologie,' 1839, p. 16, "il sera de toute évidence qu'elle n'a été établie que sur de jeunes sujets," and at p. 32, "On ne connaît que les caractères du jeune âge."

† For a description of the skeleton and dentition of *Centetes ecaudatus*, see the 'Cambridge Journal of Anatomy,' vol. i. (1867) p. 298, and vol. ii. (1868) pp. 138, 139, and 148.

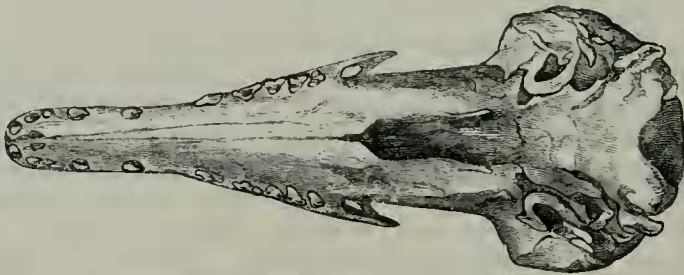
Fig. 2.



Upper view of skull, twice the size of nature.

There is no ridge or other process at the front of the orbit. As has been said, there is no sagittal crest, but a tolerably developed lambdoidal one which extends across from one glenoid surface to the other. The temporal fossa is much smaller than in *Centetes*; and the concavity which exists in the last-named genus, above and in front of the first upper premolar, is wanting in *Hemicentetes*. There is no marked concavity above the anterior opening of the infra-orbital canal, or in the summit of the cranium between the orbits. The palate is very long and narrow, but of less equal width than in *Centetes*, expanding laterally to a greater degree from before backwards. Its posterior margin is not at all or only very slightly thickened (without any transverse bony plate behind such thickening when present), and with a deep, sharp median notch. The palate projects backwards considerably beyond the last molar; it is but very slightly concave antero-posteriorly, and has no median ridge running in that direction, nor any defects of ossification.

Fig. 3.



Base of skull, twice the size of nature.

Pterygoid fossæ cannot be said to exist, the ecto-ptyergoid ridge not developing into a descending plate of bone, although distinctly perforated posteriorly. The pterygoid descends as a triangular lamella of bone ending in a delicate backwardly, downwardly, and outwardly directed hamular process. The meso-ptyergoid fossa slightly narrows as it proceeds backwards, but does not end pos-

teriorly (as in *Centetes*) in any hemispherical excavation between the basisphenoidal processes, which bend outwards to contribute to form the auditory bullæ. There is no conspicuous foramen in the place of that one which in *Centetes* is situated in the roof of the hemispherical basisphenoidal excavation. Instead of that one foramen there are two minute ones towards the anterior end of the inferior surface of the basisphenoid. The pterygoid region is much more bullate than in *Centetes*.

The foramen magnum is very large relatively, and looks almost directly backwards. On each side of it is a well-developed paroccipital process, anterior to which, but separated from it by an interspace, is a small process of the squamosal; so that there are two processes on each side as in *Centetes*, only that the mastoid (placed between them) contributes to neither, instead of to both of those processes as in the last named genus.

The small glenoid surface is bounded internally by a much smaller entoglenoid process than in *Centetes*. The tympanic bone is a mere ring.

The præmaxilla is very small, and does not nearly meet the anterior prolongation of the frontal as it does in *Centetes*. The nasals are distinctly separate for more than their anterior half, but they appear to anchylose together for their hindmost third. They extend backwards on the dorsum of the skull, about as far backwards as do the maxillæ. As in *Centetes* so in *Hemicentetes*, the parietals form more, and the frontals less of the roof of the cranium than in *Erinaceus*. The zygoma is wanting, only a small process extending backwards and outwards behind as well as above the last molar. As before said, the mastoid appears on the outer surface of the skull, where it is subtriangular, with the apex upwards, and not bifurcating inferiorly, as in *Centetes*.

The mandible has its ascending ramus only very slightly concave externally, its posterior margin between the condyle and the angle relatively much longer and more concave than in *Centetes*. On the other hand, the coronoid process is rather less raised relatively above the condyle. The inner surface of the ascending ramus above the dental foramen is much less concave. The horizontal ramus is not constricted behind the last molar. The condyle is rather elongated antero-posteriorly, and the distance from it to the coronoid process is not quite so great as from it to the mandibular angle. The last-mentioned part is flattened from above downwards, but so that it presents a slight horizontal projection, not only on the inside, but also on the outside of the vertical ramus.

There is a small, rather pointed than obtuse, prominence on the inferior margin of the mandible, a little distance in front of the angle. This is sharper than in *Centetes*.

There is a good-sized precondyloid foramen on each side, and in front of it a jugular foramen; but I have not observed a definite carotid foramen. There is a venous foramen in the posterior part of the squamosal, near its upper border, and a minute opening behind the glenoid surface. The foramen ovale appears to be

formed entirely by the alisphenoid. The optic and sphenoidal opening is hidden by an alisphenoidal lamella. There is no long bony canal for the optic nerve to traverse, as in *Erinaceus*, nor is there any suboptic foramen, nor any conspicuous orbital one. There is an alisphenoid canal, with its posterior aperture situated just in front of the foramen ovale, but it is much less conspicuous than in *Centetes*. There is no external alisphenoid canal. There is a distinct posterior palatine foramen on each side. The sphenopalatine foramen is hidden, unless it appears as a minute opening in the lower part of the large infraorbital canal. The anterior palatine foramen on each side is relatively rather large. The infraorbital foramen is exceedingly large, very much larger relatively than in *Centetes*, bounded above by a very delicate spiculum of bone. The lachrymal foramen opens immediately behind the summit of that delicate spiculum.

There are two small foramina on the outer side of the very slender horizontal ramus of the mandible; the more anterior beneath the first premolar, the more posterior beneath the first molar.

The dental formula is:—

$$I. \frac{3-3}{3-3}, C. \frac{1-1}{1-1}, P.M. \frac{3-3}{3-3}, M. \frac{3-3}{3-3} = \frac{20}{20} = 40.$$

The upper incisors on each side are all separate from each other and from the canine; and the first upper incisor is also separated by an interval from its fellow of the opposite side.

The first two incisors on each side are of nearly the same size and shape. Each is conical, pointed, and much hooked, with a very large posterior lobe.

Fig. 4.



Teeth of upper jaw, four times the size of nature.

The third incisor is much shorter, gradually broadening downwards from the socket to the distal edge.

The canine is shaped like the first two incisors, but rather larger, and with the posterior lobe relatively smaller. It is very much smaller, relatively as well as absolutely, than in *Centetes*.

The first premolar, in shape and size, is very much like the canine, though separated from the latter by an interspace, which is about three times as long as that which divides the canine from the third incisor.

The second premolar is shaped like the first premolar of *Centetes*. It is separated from the first premolar by an interval still greater than that which divides the first premolar from the canine.

It has a posterior talon, but no internal cusp. Compared with the

premolar in front of it, it is much antero-posteriorly extended, *i. e.* less canine-like.

The third premolar is nearly contiguous to the second; it is much simpler than is the homologous tooth in *Centetes*. The principal cusp predominates less over the talon; and sometimes there is a minute cusp in front of the principal one. The tooth is as it were formed entirely of the cingulum, there seeming to be nothing answering to the normal principal cusps, still less to any internal cingulum. Nevertheless it is probable that the actual principal cusp is really made up of the normal external cusps, plus the cingulum, fused together.

The first and second upper molars are similar to the last premolar, except that the part answering to the normal cusps is more developed, and extending inwards, most so in the more posterior tooth, and showing that the principal cusp of the third premolar is (as before stated) probably of similar nature. The external cingulum develops two low subequal cusps. There is no internal cingulum.

The third and last upper molar is less in antero-posterior and very much less in vertical extent than is the tooth in front of it. Also the cingulum bears a smaller proportion to the rest of the tooth, which thus comes to consist of two subequal parts, one exterior, the other internal. All the molars are contiguous to each other and to the third premolar.

In the lower jaw the six incisors are much closer together than are those of the upper jaw. This is less due to their implantation than to the lateral expansion of their crowns. They are less vertically extended than are the upper ones, and each expands upwards from the root to the cutting-edge.

Fig. 5.



Teeth of lower jaw, four times the size of nature.

The canine is very much smaller, relatively as well as absolutely, than in *Centetes*. It is not received into any fossa in the upper jaw. It is a much curved conical tooth, with a considerable posterior cusp at its base. The first premolar, in size and shape, is quite like the canine in front of it. It is separated from the latter by a considerable interval.

The second premolar is quite like the first lower premolar of *Centetes*. It consists of three unequal cusps, without any internal production. The middle cusp is much the largest, and curved and pointed like the principal cusp of the first premolar.

The third premolar projects inwardly hardly, if at all, more than

the second; and it resembles the latter tooth in size and shape, except that the anterior of the three cusps is larger. The three true molars are very similar in size and shape to the third premolar, except that a cusp projects internally from the inner side of the posterior part of each. They resemble the homologous teeth of *Centetes*, squeezed together (as it were) from within outwards, while the posterior prism of each nearly aborts—thus approximating to *Chrysochloris*.

Fig. 6.



Scapula, clavicle, humerus, radius, and ulna; once and a half the size of nature.

Fig. 7.



Carpus, twice the size of nature.

Fig. 8.



Vertebra, once and a half the size of nature.

The skeleton of *Hemicentetes* closely resembles that of *Centetes*, except that the neural spines, especially the cervical ones, are relatively, as well as absolutely, less developed, and that the dorso-lumbar vertebræ are twenty, or at most twenty-one, in number, instead of twenty-three or twenty-four as in *Centetes*. The pubic

Fig. 9.



Pelvis, once and a half the size of nature.

symphysis is also widely open in some individuals (probably females); and the humerus is not quite so long as the scapula. Moreover the os scaphoides is distinct from the os lunare; and there is no os intermedium.

Since the publication of my paper on the osteology of the Insectivora* additional material has come to hand. Thus skeletons not only of *Hemicentetes* (formerly known as *Centetes madagascariensis*), but also new ones of *Rhynchocyon* and *Petrodromus*, have been added to the British Museum and the collection of the Royal College of Surgeons. At the last-named institution there has also been received a perfect skeleton of *Ericulus*, which is here figured by the kind permission of the Council and Curator.

Rhynchocyon.—As to this genus I am now able to add that the occipital foramen looks mainly backward, that the pterygoid fossa does not nearly extend so far forward as the hinder margin of the palate; that there is no paroccipital process, and that there is a very small mastoid process just behind the external auditory meatus, but a more marked projection at the lower end of the mastoid where it runs down behind the auditory bulla at the posterior end of the harmonia joining the tympanic to the petrosal.

I may also add that, in a skull in the British Museum, I find there are two minute teeth in the place of the first upper premolar. As

* See 'Cambridge Journal of Anatomy,' vol. i. (1867) p. 281, and vol. ii. (1869) p. 117.

the specimen is fully adult and the teeth even more worn than in the skull with the normal dentition, these small teeth can hardly belong to the milk-dentition.

Petrodromus.—In a new specimen, in which the last molars and the upper and lower anterior incisors are not in place, I have observed the following characters:—

There is no sagittal crest; the petro-mastoid, which is a single bone, is separate from the squamosal, which sends down a considerable entoglenoid process.

The anterior part of the auditory bulla is formed by the alisphenoid. The petrosal has a large cerebellar fossa.

A spatulate process extends backward from the middle of the hinder margin of the palate.

A small foramen perforates a process of the parietal, which descends between the alisphenoid and squamosal.

The rhinencephalic chamber is extensive. The second upper incisor has a small cusp at its base behind; and the lower incisors are bilobed*.

In this specimen there are but six lumbar vertebræ, and the internal condyle of the humerus is perforated.

Ericulus.—There is now a complete skeleton of this form in the Museum of the Royal College of Surgeons; and a plate representing it is here given by the kind permission of the authorities of that institution. It has 16 dorsal, 7 lumbar, 22 sacral, and about 12 caudal vertebræ. The spinous process of the axis is large, but the other cervical spines are quite rudimentary. The cervical transverse processes are not much antero-posteriorly expanded. The dorsal spines are but slightly elongated; but those of the lumbar vertebræ are very much enlarged and antero-posteriorly extended. The lumbar metaphyses, anapophyses, and transverse processes are small; but the lumbar spines have tolerably marked hyperapophyses. There are no hypapophysial processes. The manubrium is of moderate size and not keeled. The clavicles are elongated and slender.

Thus the genera of the order Insectivora yet known amount to 24 in number.

INSECTIVORA.

Family	I. GALEOPITHECIDÆ: Galeopithecus.
„	II. MACROSCOLIDIDÆ: Macroscelides, Petrodromus, Rhynchocyon.
„	III. TUPAIDÆ: Tupaia, Ptilocercus, Hylomys.
„	IV. ERINACEIDÆ: Gymnura, Erinaceus.
„	V. CENTETIDÆ: Centetes, Hemicentetes, Ericulus, Echinops, Solenodon.
„	VI. POTAMOGALIDÆ: Potamogale.
„	VII. CHRYSOCHLORIDÆ: Chrysochloris, Chalcochloris.
„	VIII. TALPIDÆ.
	Subfamily I. <i>Talpina</i> : Scalops, Scapanus, Condylura, Talpa.
	„ II. <i>Myogalina</i> : Urotrichus, Myogale.
„	IX. SORICIDÆ: Sorex.

* As observed by Dr. Peters in his 'Reise nach Mossambique,' i. Säugethiere, p. 95, tab. xxii. fig. 9.

With the corrections and additions* possible at this date the osteological characters of these groups may be stated as follows:—

GALEOPITHECIDÆ.

GALEOPITHECUS, Pallas†

Dentition: I. $\frac{2-2}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{2-2}{2-2}$, M. $\frac{3-3}{3-3}$ = 34. Cranium broad, depressed; muzzle obtuse; skull broadest between posterior roots of zygomata, which are complete and strong, but short; well-developed postorbital processes, sometimes enclosing orbits; margin of orbit sharp, with a small process in front; orbit large, temporal fossa rather small; a tympanic bulla; no alisphenoid canal; concave posterior margin of palate far forwards; pterygoid fossa minute; no basisphenoidal or paroccipital processes; large swollen mastoid process on each side; strong postglenoid process, tending much forwards; optic foramen large; foramen rotundum and sphenoidal fissure represented by one opening; a supraorbital, but no suboptic foramen; several small suborbital foramina on each side; anterior palatine foramina very large; lachrymal foramen small, opening within the orbit; upper canine and second incisor each with two roots; lower incisors pectinated; upper and lower molars very complex. Thirteen or fourteen dorsal, five or six lunar, five or six sacral, and many caudal vertebræ; ribs very broad; clavicles long, a scapholunar bone, but no os intermedium; ulna ankylosed to radius; fibula complete, but smallest towards its upper end; metatarsals shorter than digits; five digits to each extremity; a large cæcum.

Hab. South-eastern Asia and Indian archipelago.

MACROSCOLIDIDÆ.

Dentition: I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$. Skull broadest between posterior roots of zygomata, which are complete and rather deep; orbits not encircled by bone; generally no postorbital processes; dorsum of muzzle concave transversely; palate sometimes decidedly extending backwards beyond last molar; orbit large, temporal fossa very small; a tympanic bulla; no paroccipital process; no alisphenoid canal, malar imperforate; carotid, postglenoid, and suboptic foramina; one opening representing both sphenoidal fissure and foramen rotundum; foramen ovale large; lachrymal foramen opening well within the orbit; coronoid process of mandible not rising much, if at all, above condyle; canine close to premaxillary suture; last upper premolars not more vertically extended than the true molars; upper molars quadricuspid, the anterior and posterior cusps being connected by transverse ridges. Thirteen dorsal and six or eight lumbar vertebræ, lumbar transverse processes much extended antero-

* Prof. Flower, in his 'Introduction to the Osteology of the Mammalia,' p. 149, has noticed the conditions of the tympanic in the different groups.

† Pallas, Act. Petrop. iv. 1. p. 208, tab. viii.; De Blainville, 'Ostéographie: Lemur,' pls. vi., viii., ix.; Waterhouse, Trans. Zool. Soc. ii. p. 335, pl. Iviii.; Wagner, Schreb. Supplem. i. p. 318, v. p. 522.

posteriorly; no hyperapophyses; hypapophyses beneath lumbar vertebræ; scapula with a long metacromion; clavicles slender; internal condyle of humerus perforated; scaphoid and semilunar separate; pelvic symphysis elongated; metatarsus as long as, or longer than, digits, and much longer than tarsus; sometimes only four digits; a cæcum.

Hab. Africa.

MACROSCELIDES*, Smith.

Dentition: I. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$ or $\frac{3-3}{4-4}$. Skull sometimes much inflated by air-cavities, always much contracted between orbits; no post-orbital process; large defects of ossification in the palate; pterygoid fossa extending forwards to posterior margin of palate; suboptic foramen not conspicuous; infraorbital canal very short, the lachrymal foramen opening immediately above posterior termination of infraorbital canal; angle of mandible elongated; upper incisors and canines all of much the same size; third incisor with a single root; third lower molar but little smaller than the first or second. Six or seven lumbar vertebræ; cervical spines very rudimentary; ulna ankylosed to radius; five digits to each extremity.

Hab. Africa, including the the northern part.

PETRODROMUS†, Peters.

Dentition: I. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. A strongly marked sagittal ridge; skull never much inflated; no postorbital process; large defects of ossification in the palate; pterygoid fossa extending forwards to the posterior margin of palate; suboptic foramen conspicuous; infraorbital canal short; angle of mandible elongated; first upper incisor very much larger than the second; third incisor with two roots; third lower molar but little smaller than the first or second; six or seven lumbar vertebræ; cervical spinous processes very small; ulna ankylosed to radius; five digits to the manus, four to the pes.

Hab. Eastern Africa.

RHYNCHOCYON‡, Peters.

Dentition: J. $\frac{1-1}{3-3}$ or $\frac{0-0}{3-3}$, M. $\frac{3-3}{3-3}$. A strongly marked sagittal ridge; skull never inflated; cranium proper broad, flattened above and very little narrowed between the orbits; a marked postorbital process; no defects of ossification in the palate; pterygoid fossa extending not nearly so far forwards as the posterior margin of the pa-

* De Blainville, 'Ostéographie: Insectivores,' p. 57, pls. iii., v., vii., viii., x.; Wagner, Schreber. Supplem. ii. p. 81, v. p. 534; Duvernoy, Mém. de Strasb. i. tab. i., ii., iii. p. 50; Dr. Andrew Smith, 'Zool. South Africa,' pl. xv.; Prof. Peters, 'Reise nach Mossambique,' p. 87, tab. xxii.; Geoff. St.-Hilaire, Ann. Sc. Nat. 1829, xviii. pp. 165-173.

† Prof. Peters, 'Reise nach Mossambique,' p. 92, tab. xxii., xxiii.; Wagner, Schreb. Supplem. v. p. 538.

‡ Prof. Peters, 'Reise nach Mossambique,' p. 100, tab. xxii., xxiii.; Wagner, Schreb. Supplem. v. p. 531.

late; præmaxilla very small; suboptic foramen conspicuous; infra-orbital canal very long, the lachrymal foramen opening in front of its posterior termination; angle of mandible very short; canine very much larger than the incisor, and with two roots; third lower molar considerably smaller than the first or second one. Eight lumbar vertebræ; cervical spines pretty well developed; ulna complete; only four digits to either manus or pes.

Hab. Eastern Africa.

TUPAIDÆ.

I. $\frac{2-2}{3-3}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull broadest between the posterior roots of the zygomata, which are complete and slender; orbits enclosed by bone or at least a postorbital process; dorsum of muzzle convex transversely; a tympanic bulla; an external alisphenoid canal; molar perforated; carotid and postglenoid foramina, but no suboptic foramen; foramen ovale a narrow aperture widely separated from the spheno-orbital opening; lachrymal foramen at margin of orbit or rather without it; coronoid process of mandible rising much above condyle; canine not close to premaxillary suture; upper molars with four more or less marked principal cusps and an external cingulum, which tends to form, with the two outer principal cusps, two triangular prisms. Thirteen dorsal, five to seven lumbar vertebræ; lumbar transverse processes not much antero-posteriorly extended; well-developed hyperapophyses; no hypapophyses; scapula with only a rudimentary metacromion; clavicles slender; a scapho-lunar bone and os intermedium; pelvic symphysis elongated; tibia and fibula distinct*; metatarsus but very little longer than the tarsus; five digits to each extremity; a cæcum.

Hab. South-eastern Asia and the Indian archipelago.

TUPAIA †, Raffles.

Dentition: I. $\frac{2-2}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Skull much narrowed anteriorly; zygoma very slender; orbits large and completely encircled by bone; anterior margin of orbit sharply prominent; a process above the lachrymal foramen; temporal fossa very small; posterior margin of palate not thickened; small defects of ossification in palate; pterygoid fossa very small, and distant from palate; no paroccipital process; postglenoid process rudimentary; molar with a large perforation; foramen rotundum distinct from spheno-orbital fissure; a supraorbital foramen; infra-orbital canal long and narrow; posterior palatine foramen large; cingulum of upper molars developing cusps; triangular prisms

* I presume that *Ptilocercus* and *Hylomys* agree with *Tupaia* in this character.

† Horsfield's 'Zool. Researches,' 1824, 3 plates; Raffles, Linn. Trans. xiii. p. 257; Müller und Schlegel, Verhandl. 1839-1844; De Blainville, 'Insectivores,' pls. iii., vi., & x.; F. Cuvier's 'Dents des Mammifères,' no. xvii.; Owen's 'Odontography,' pl. cxi. fig. 3; Wagner, Schreb. Suppl. ii. p. 37, v. p. 525.

rather well developed; the two hinder upper premolars much more vertically extended than the true molars. Caudal vertebræ numerous.

Hab. South-eastern Asia and Indian archipelago.

PTILOCERCUS*, Gray.

Dentition: I. $\frac{2-2}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Skull much narrowed behind the postorbital processes; orbits very nearly encircled by bone; the anterior margin of each not sharply prominent; no process above the lachrymal foramen; temporal fossa large; posterior margin of palate slightly thickened; no defects of ossification in palate; pterygoid fossæ distant from palate; a ridge-like paramastoid process; postglenoid process rather large; malar perforation very small; foramen rotundum and spheno-orbital fissure represented by a single opening; no supraorbital foramen; infraorbital canal large but very short; posterior palatine foramen very small; external cingulum of upper molars not developing distinct cusps; last upper premolar much more vertically extended than the true molars. Caudal vertebræ numerous.

Hab. Borneo.

HYLOMYS †, Müller and Schlegel.

Dentition: I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. Skull not much narrowed anteriorly, rather so between the orbits; only a small postorbital process; a process above the lachrymal foramen; no defects of ossification in palate; pterygoid fossæ extending forwards to posterior margin of palate; malar with a small perforation; infraorbital canal rather large, but not much elongated; no supraorbital foramen; external cingulum of upper molars not developing cusps; last upper premolar much more vertically extended than the true molars. Caudal vertebræ few in number.

Hab. Java, Sumatra, and South-eastern Asia.

ERINACEIDÆ.

I. $\frac{3-3}{1-1}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull broadest between the posterior roots of the zygomata, which are complete though somewhat slender; no postorbital process; a ridge and process in front of orbit; temporal fossa large; pterygoid fossæ well developed; a transverse ridge at posterior part of palate, with a narrow transverse plate behind it; paroccipital and mastoid processes; nasals separate; malar imperforate, small, suspended in zygoma; tympanic a mere ring, not forming a bulla; a glenoid, but no distinct carotid fora-

* Gray, Proc. Zool. Soc. 1848, p. 24, and 'Zoology of Voyage of H.M.S. Samarang,' 1850, p. 18, pl. v.; Wagner, Schreber, Supplem. v. p. 528.

† Müller and Schlegel, Verhandl. i. p. 50, tab. xxv. figs. 4-7; Wagner, Schreber, Supplem. ii. p. 554, & v. p. 530; Blyth, Journal Asiatic Soc. Bengal, 1859, p. 293.

men; foramen rotundum distinct from sphenoidal fissure; optic nerve traversing an elongated and very small canal; a suboptic foramen; infraorbital canal rather long; no true alisphenoid canal; lachrymal foramen opens just in front of orbit; ascending ramus of mandible very concave externally; first two upper molars quadricuspid, with an oblique ridge in each connecting the postero-external cusp with the antero-internal one. Fourteen or fifteen dorsal vertebræ and five or six lumbar vertebræ; no hyperapophyses or hypapophyses; all lumbar processes small; clavicles slender; scapula with a long, pointed metacromion process; ulna complete and distinct; a scapho-lunar bone and os intermedium; pubic symphysis very small or absent; fibula anchylosed below to tibia; metatarsus short; five digits to each extremity; no cæcum.

Hab. Europe, Asia, Africa.

ERINACEUS*, Linnæus.

I. $\frac{3-3}{2-2}$, P.M. $\frac{3-3}{2-2}$. Skull slightly constricted between the orbits; transverse plate behind the posterior palatine ridge continuous with outer walls of pterygoid fossæ; defects of ossification in palate; no external alisphenoid canal; mesopterygoid fossa ending posteriorly in an excavation of the *basis cranii*; suboptic foramen small and hidden; spheno-palatine foramen close to the foramen rotundum; upper canine small, generally with two roots; third upper and lower molars very small. Three sacral vertebræ; caudal vertebræ not numerous; spinous process of axis moderate; humerus generally with no supracondyloid foramen; tuberosity of ischium not much prolonged backwards; femur with a moderate ectogluteal ridge.

Hab. Europe, Asia, Africa.

GYMNURA †, Vigors and Horsfield.

I. $\frac{3-3}{3-3}$, P.M. $\frac{4-4}{4-4}$. Skull much constricted between the orbits; transverse plate behind posterior ridge of palate not continuous with outer walls of pterygoid fossæ; no defects of ossification in palate; an external alisphenoid canal; mesopterygoid fossa not ending posteriorly in any excavation; suboptic foramen large and conspicuous; spheno-palatine foramen remote from foramen rotundum; upper canine large and conical, with one root; third upper molar quadricuspidate; third lower molar quite like the second. Five sacral vertebræ; caudal vertebræ numerous; spinous process of axis very large; tuberosity of ischium much prolonged backwards; femur with a very strong ectogluteal ridge.

Hab. Malacca, Sumatra.

* De Blainville, 'Insectivores,' p. 36, pls. vi., vii., viii., & x.; F. Cuvier, 'Dents des Mammifères,' no. xvi.; Owen, 'Odontography,' ii. pl. cx. fig. 5; Wagner, Suppl. ii. p. 10.

† De Blainville, 'Insectivores,' pls. vi. & x.; Owen, 'Odontography,' ii. pl. cxi. fig. 4; Horsfield and Vigors, Zoolog. Journ. iii. p. 246, pl. viii.; Wagner, Schreb. Supplem. ii. p. 45, v. p. 533.

CENTETIDÆ.

I. $\frac{2-2}{3-3}$ or $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull very cylindrical, broadest between the glenoid surfaces; no zygoma; no postorbital process; no process and, generally, no ridge in front of the orbit; temporal fossa large; no pterygoid fossa; tympanic a mere ring, not forming a bulla; paroccipital and mastoid processes; nasals more or less united; malar imperforate; a glenoid, but no distinct carotid foramen; foramen rotundum one with sphenoidal fissure; optic foramen very small, but not forming a long canal; no suboptic foramen; infraorbital canal short and wide; lachrymal foramen opening close to, or just in front of, anterior margin of orbit; a true alisphenoid canal; no external alisphenoid canal; upper true molars each forming one triangular prism, the two external principal cusps of a quadricuspid molar being here represented by a single prominence; lower true molars with very small posterior processes. Fifteen to nineteen dorsal vertebræ; lumbar processes small; no hypapophyses in the trunk, but distinct hyperapophyses; scapula with an obtuse metaacromion process; a supracondyloid foramen to humerus; mostly an os intermedium; pubic symphysis very small, sometimes widely open; tibia and fibula distinct*; metatarsus short; five digits to each extremity; no cæcum.

Hab. Madagascar and West Indies.

CENTETES †, Illiger.

I. $\frac{2-2}{3-3}$ or $\frac{3-3}{3-3}$, P.M. $\frac{3-3}{3-3}$. No interorbital constriction; skull exceedingly cylindrical; posterior margin of palate thickened; mesopterygoid fossa ending posteriorly in an excavation of the *basis cranii*; slightly marked prominence from the inferior margin of the mandible, and placed some distance in front of the angle; a glenoid foramen; posterior palatine foramen large; no defects of ossification in palate; ascending ramus of mandible only slightly concave externally; canines long, pointed; apex of lower canine received into a fossa; first upper incisor small; second upper premolar not like the true molars; eighteen or nineteen dorsal vertebræ; a scapho-lunar bone; an os intermedium.

Hab. Madagascar.

HEMICENTETES, Mivart.

I. $\frac{3-3}{3-3}$, P.M. $\frac{3-3}{3-3}$. No interorbital constriction; skull exceedingly elongated and tapering anteriorly; nasals partly united; infraorbital canal very short and wide; lachrymal foramen opening just in front of the anterior margin of the orbit; mesopterygoid fossa

* I presume that *Echinops* agrees with the other genera of the *Centetidæ* in this character.

† De Blainville, 'Insectivores,' pls. iv., vi., & x.; F. Cuvier, 'Dents des Mammifères,' no. xix.; Owen, 'Odontography,' pl. cx. fig. 6; Wagner, Schreb. Suppl. ii. p. 30, v. p. 582.

not ending posteriorly in an excavation of the *basis cranii*; a slightly marked prominence at the inferior margin of the mandible, a little in front of the angle of the jaw; posterior palatine framina rather large; no defects of ossification in the palate; anterior incisors very strongly bilobed; canines small; apex of lower canine not received into a fossa; first premolar above and below like the adjacent canine; second premolar, both above and below, separated from the first premolar by a larger interval than that which divides the first premolar from the canine; molars with the antero-posterior diameter greatly exceeding the transverse diameter of the same tooth; posterior prism of lower molars almost aborted. Fifteen or sixteen dorsal vertebræ; no os intermedium; scaphoid and semilunar bones distinct; pubic symphysis very small, sometimes widely open.

Hab. Madagascar.

ERICULUS*, Is. Geoff.

I. $\frac{2-2}{2-2}$, P.M. $\frac{3-3}{3-3}$. No interorbital constriction; posterior margin of palate not thickened, and projecting much backwards beyond the last molars; mesopterygoid fossa ending posteriorly in an excavation of the *basis cranii*; no glenoid foramen; no defects of ossification in palate; posterior palatine foramen small; ascending ramus of mandible only slightly concave externally; canines not much elongated; second upper premolar shaped like the true molars; scaphoid and semilunar bones separate; an os intermedium. Sixteen dorsal and seven lumbar vertebræ; cervical spines rudimentary.

Hab. Madagascar.

ECHINOPS †, Martin.

I. $\frac{2-2}{2-2}$, P.M. $\frac{2-2}{2-2}$. No interorbital constriction; posterior margin of palate not thickened, and projecting a little beyond last molars; mesopterygoid fossa not ending posteriorly in an excavation of the *basis cranii*; posterior palatine foramen small; ascending ramus of mandible only slightly concave externally; first upper incisor much larger than the second; canines not much elongated; second upper premolar shaped like the true molars.

Hab. Madagascar.

SOLENOTODON ‡, Brandt.

I. $\frac{2-2}{2-2}$, P.M. $\frac{4-4}{4-4}$. Skull not very cylindrical; cranium some-

* Is. Geoff. Mag. de Zool. 1839, p. 25; De Blainville, 'Insectivores,' pl. vi. & x.; Wagner, Schreb. Supplem. ii. pp. 33 & 551, & v. p. 584; Peters, Monatsber. Akad. Wissen. Berlin, 1865, p. 286.

† Martin, Trans. Zool. Soc. ii. p. 249, pl. xvi.; Peters (*Echinogale*), Monatsber. Akad. W. Berlin, 1865, p. 286; Wagner (*Echinogale*), Schreb. Supplem. ii. pp. 30 & 549, v. p. 585.

‡ Brandt, Mém. de Pétersb. 1833, 6th series, ii.; F. Poey, 'Memorias sobre la historia natural de la Isla de Cuba,' i. Habana, 1851, p. 23; Peters, Abhandlungen der K. Akad. der Wissen. zu Berlin, 1864, p. 1, pls. 1-3; De Blainville, 'Insectivores,' p. 53, pls. v. & ix.; Owen, 'Odontography,' pl. cxi. fig. 1; Wagner, Schreb. Supplem. ii. p. 79, v. p. 566.

what constricted between the orbits; posterior margin of palate thickened; a ridge in front of the orbit; mesopterygoid fossa not ending posteriorly in an excavation of the *basis cranii*; no paroccipital process; præmaxilla somewhat produced; ascending ramus of mandible deeply concave externally; condyle much transversely extended; a sharp process from the inferior margin of the mandible some distance in front of the angle; large glenoid foramen; posterior palatine foramen moderate; lachrymal foramen just in front of the orbit; first upper incisor much larger than the second; canine very small; apex of second lower incisor received into a fossa. Fifteen dorsal vertebræ; a scapho-lunar bone.

Hab. Hayti and Cuba.

POTAMOGALIDÆ*.

POTAMOGALE, Du Chaillu.

Dentition: I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Skull not cylindrical; broadest between the glenoid surfaces; no zygoma; no postorbital process; no ridge or process in front of the orbit; temporal fossa large; no pterygoid fossa; no tympanic bulla; paroccipital processes directed backwards; nasals united; molar imperforate; very large precondyloid perforations; a small glenoid, but no distinct carotid foramen; foramen rotundum one with sphenorbital fissure; optic foramen very small, but not forming a long canal; a suboptic foramen; infraorbital canal short and wide; no lachrymal foramen; a true alisphenoid canal; no external alisphenoid canal; upper true molars each forming two very narrow and approximated triangular prisms, the two external principal cusps of a quadricuspid molar being represented by two distinct prominences; lower true molars with rather large posterior processes. Sixteen dorsal vertebræ; caudal vertebræ numerous; lumbar processes small; decided hyperapophyses; scapula without a metacromion; no clavicles; no supracondyloid foramen to humerus; ulna complete and distinct; scaphoid and semilunar bones separate; no os intermedium; pubic symphysis very small; tibia and fibula ankylosed together below; five digits to each extremity; no cæcum.

Hab. Old Calabar.

CHRYSOCHLORIDÆ†.

I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Skull very broad and high, tapering sharply forwards; greatest breadth between the posterior roots of the zygomata, which are complete and rather deep arches; no post-

* Prof. Allman, *Trans. Zool. Soc.* vi. p. 1, pls. i. & ii.; Prof. J. V. Barboza du Bocage, 1^a Classe da Academia de 27 d'Abril, 1865, Lisbon, described under the name *Bayonia velox*; Peters, *Monatsbr. Akad. W. Berlin*, 1865, p. 286.

† De Blainville, 'Insectivores,' pls. v., vii., viii. & ix.; F. Cuvier, 'Dents des Mammifères,' no. xviii.; Owen, 'Odontography,' pl. cx. fig. 1; Wagner, Schreb. *Suppl.* ii. p. 118, v. p. 579; Peters, 'Reise nach Mossambique,' p. 69, tab. xxii.

orbital process; occiput not sloping much forwards; præmaxillæ peculiarly produced; lambdoidal ridge traversing summit of cranium; no ridge or process in front of orbit; a tympanic bulla; no alisphenoid canal; no pterygoid fossa; no paroccipital process; glenoid surface very small; ascending ramus of mandible very low, peculiarly truncated; coronoid process very low, a carotid foramen; a small glenoid foramen; sphenoidal fissure and foramen rotundum represented by one opening; infraorbital foramen large and single; lachrymal foramen minute; true molars each in the form of a triangular prism; first upper incisor larger than the second; canine small. Nineteen or twenty dorsal vertebræ; cervical neurapophyses not very narrow antero-posteriorly; no cervical hypapophyses; spines of dorsal and lumbar vertebræ well developed; no hyperapophyses; no hypapophysial ossicles beneath the lumbar vertebræ; manubrium slightly keeled, but not much enlarged; clavicles long and very slender; humerus not very short; ulna complete and distinct; scapula broad, with a blunt metacromion; scaphoid and semilunar distinct; no sickle-shaped carpal ossicle or os intermedium; pelvis widely open below; tibia and fibula anchylosed together inferiorly; four digits to manus, five to pes; no cæcum; an ossified tendon in the forearm.

Hab. Southern and Eastern Africa.

CHRYSOCHLORIS, Lacépède.

M. $\frac{3-3}{3-3}$; a vesicular enlargement in the temporal fossa; lower molars without any posterior process.

CHALCOCHLORIS, St. G. Mivart.

M. $\frac{2-2}{2-2}$; no enlargement in the temporal fossa; lower molars with a marked posterior process.

TALPIDÆ.

C. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$. Cranium very broad behind, but not high; tapering much, but gradually, forwards; greatest breadth behind the posterior roots of the zygomata, which are complete but exceedingly slender arches; occiput inclined much forwards; no postorbital process; no ridge or process in front of the orbit; temporal fossa small; a tympanic bulla; no alisphenoid canal; mesopterygoid fossa not ending posteriorly in any excavation of the *basis cranii*; foramen magnum very large; no paroccipital or mastoid processes; glenoid surface small, and situated high up; no distinct postglenoid process; ascending ramus of mandible not very low; supraoccipital enormous; generally a large pterotic; meatus auditorius externus opening decidedly below the glenoid surface; a carotid, but no glenoid foramen; foramen rotundum and sphenoidal fissure represented by one opening; infraorbital foramen very large; lachrymal foramen very small; molars above and below, each formed of two triangular prisms. Cervical neurapophyses very narrow antero-

posteriorly; no cervical hypapophyses; spines of dorsal and lumbar vertebræ small; no hyperapophyses; autogenous hypapophysial ossicles beneath the interspaces of the lumbar vertebræ; manubrium keeled; scapula long and very narrow; radius and ulna distinct; an os intermedium; no symphysis pubis; tibia and fibula confluent below; five digits to each extremity; no cæcum.

Hab. Europe, Asia, including Japan, and North America.

TALPINA.

No distinct pterygoid fossa*; pterygoid region inflated; coronoid process not very elevated; spiculum of bone bounding infraorbital foramen above very narrow; as many as three incisors above; manubrium very elongated; clavicles very short and broad; no metacromion process; a sickle-shaped carpal ossicle.

Hab. Europe, Asia, North America.

TALPA †, Linnæus.

I. $\frac{3-3}{2 \text{ or } 3-3 \text{ or } 2}$, C. $\frac{1-1\frac{1}{2}}$, (?) P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. Cranium very slightly constricted between the orbits; palate with no posterior thickening, but a small defect of ossification on each side; a very large pterotic; a fissure bordering epiotic; posterior palatine foramen large; anterior palatine foramen small; all the incisors very small; upper canine very elongated; lower canine small; posterior cusps of premolars very small. Five or six lumbar vertebræ; caudal vertebræ few; ultimate phalanges of manus much the longest, bifurcating.

Hab. Europe and Asia.

CONDYLURA §, Illiger.

I. $\frac{3-3}{3-3}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. No fissure bordering epiotic; meatus auditorius with a very large external opening; muzzle much attenuated anteriorly; first and third upper incisors much larger than the second; upper canine very small; lower canine much larger than lower incisors; lower third incisor much smaller than the first or second; posterior cusps of premolars very large. Seven

* I cannot be sure as to *Condylura* in this respect.

† De Blainville, 'Ostéographie: Insectivores,' pls. i., v., & ix.; F. Cuvier, 'Dents des Mammifères,' no. xxii.; Owen, 'Odontography,' pl. ex. fig. 3; C. Giebel, Zeitschr. f. d. ges. Naturwiss. Halle, Bd. xii. 1858, pp. 395-450; Wagner, Schreb. Supplem. ii. p. 106, v. p. 576.

‡ Mr. C. Spence Bate, F.R.S., in a paper read at the Odontological Society of Great Britain (published in the 'Annals and Mag. of Nat. Hist.' for June 1867), states that the tooth here called canine is implanted in the præmaxilla. The conflicting nature, however, of the remarks contained in that paper render other observations necessary.

§ De Blainville, 'Insectivores,' pls. i., v., & ix.; F. Cuvier, 'Dents des Mammifères,' no. xxii. bis; Wagner, Schreb. Supplem. ii. p. 113, v. p. 574; S. F. Baird, 'Mammals of America,' p. 71.

lumbar vertebræ; caudal vertebræ numerous; ultimate phalanges of manus not bifurcating.

Hab. North America.

SCAPANUS*, Pernel.

I. $\frac{3-3}{3-3}$ †, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{4-4}$, M. $\frac{3-3}{3-3}$. No fissure bordering the epiotic; cranium with a very slight interorbital constriction; palate not extending back beyond the last molars; first upper incisor much larger than the second or third one; the two upper posterior incisors, the upper canine, and first two premolars all of nearly the same size; lower incisors, canines, and premolars very gradually increasing in size from before backwards.

Hab. North America.

SCALOPS ‡, Cuvier.

I. $\frac{3-3}{2-2}$, C. $\frac{1-1}{0-0}$, P.M. $\frac{3-3}{3-3}$, M. $\frac{3-3}{3-3}$. Cranium with a very marked interorbital constriction; no fissure bordering the epiotic; palate extending back beyond the last molars; first incisor very large, second and third minute; upper canine long and conical, and much more vertically extended than the first upper premolar; second lower incisor much larger than the first.

Hab. North America.

MYOGALINA.

A distinct pterygoid fossa; pterygoid region not inflated; no open fissure bordering opiotic; coronoid process very lofty; never as many as three incisors above §; first upper incisor longest tooth of upper jaw; manubrium not very large; clavicle and humerus elongated; a metacromion process; no sickle-shaped carpal bone.

MYOGALE ||, Cuvier.

I. $\frac{2-2}{2-2}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{5-5}{5-5}$, M. $\frac{3-3}{3-3}$. Cranium with a very marked interorbital constriction; palate prolonged beyond the last molar,

* Pernel, Bulletin de la Soc. Géologique de France, 1849, vi.; S. F. Baird, 'Mammals of N. Western America,' p. 58, pl. xxx.; Le Conte, Proc. of Acad. of Philadelphia, vi. p. 326; Bachman, Journ. Acad. Nat. Sci. Phil. viii. 1839, p. 58; Wagner, Schreb. Supplem. v. p. 574.

† Prof. Peters considers that there are but four upper incisors.

‡ De Blainville, 'Insectivores,' pls. v. & ix.; F. Cuvier, 'Dents des Mammifères,' xxii.; Owen, 'Odontography,' pl. ex. fig. 2; Giebel, Zeitschr. f. d. ges. Naturwiss. Halle, Bd. xii. 1858, pp. 395-405; Wagner, Schreb. Supplem. ii. p. 102, v. pp. 571, 807; Baird, 'Mammals of America,' p. 58, pl. xxx.; Bachman, Boston Journal N. H. 1843, ii. p. 28; Le Conte, Proc. of Acad. of Philadelphia, vi. p. 326.

§ Possibly there may also be only four upper incisors in *Scalops* and *Scapanus*.

|| J. F. Brandt, Archiv fur Natur. 2 Jahrg. 1836, i. p. 176; Geoff. Mém. du Mus. i. tab. xv. figs. 10-12, 1815; De Blainville, 'Insectivores,' pls. ii., v., and ix.; F. Cuvier, 'Dents des Mammifères,' no. xxi.; Wagner, Schreb. Suppl. ii. p. 95, v. p. 567.

its posterior margin thickened; a large perforation in each exoccipital; anterior palatine foramen very large; infraorbital foramen bounded above by a broad spiculum of bone; the *very* small lachrymal foramen opens at the anterior side of the upper end of the spiculum; first upper incisor the largest and longest of all the teeth; second upper incisor very small. Cervical neurapophyses mere filaments; many caudal vertebræ; pes rather or very elongated, both absolutely and compared with manus.

Hab. Eastern and Western Europe.

UROTRICHUS*, Temminck.

I. $\frac{2-2}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{4-4}{1-1}$, M. $\frac{3-3}{3-3}$. Lachrymal foramen immediately above the middle of the infraorbital foramen; no large exoccipital perforation; infraorbital foramen bounded above by a very slender spiculum of bone; second upper incisor of considerable size, though not nearly so large as the first incisor. Few caudal vertebræ; pes not elongated.

Hab. Japan and Western N. America.

SORICIDÆ.

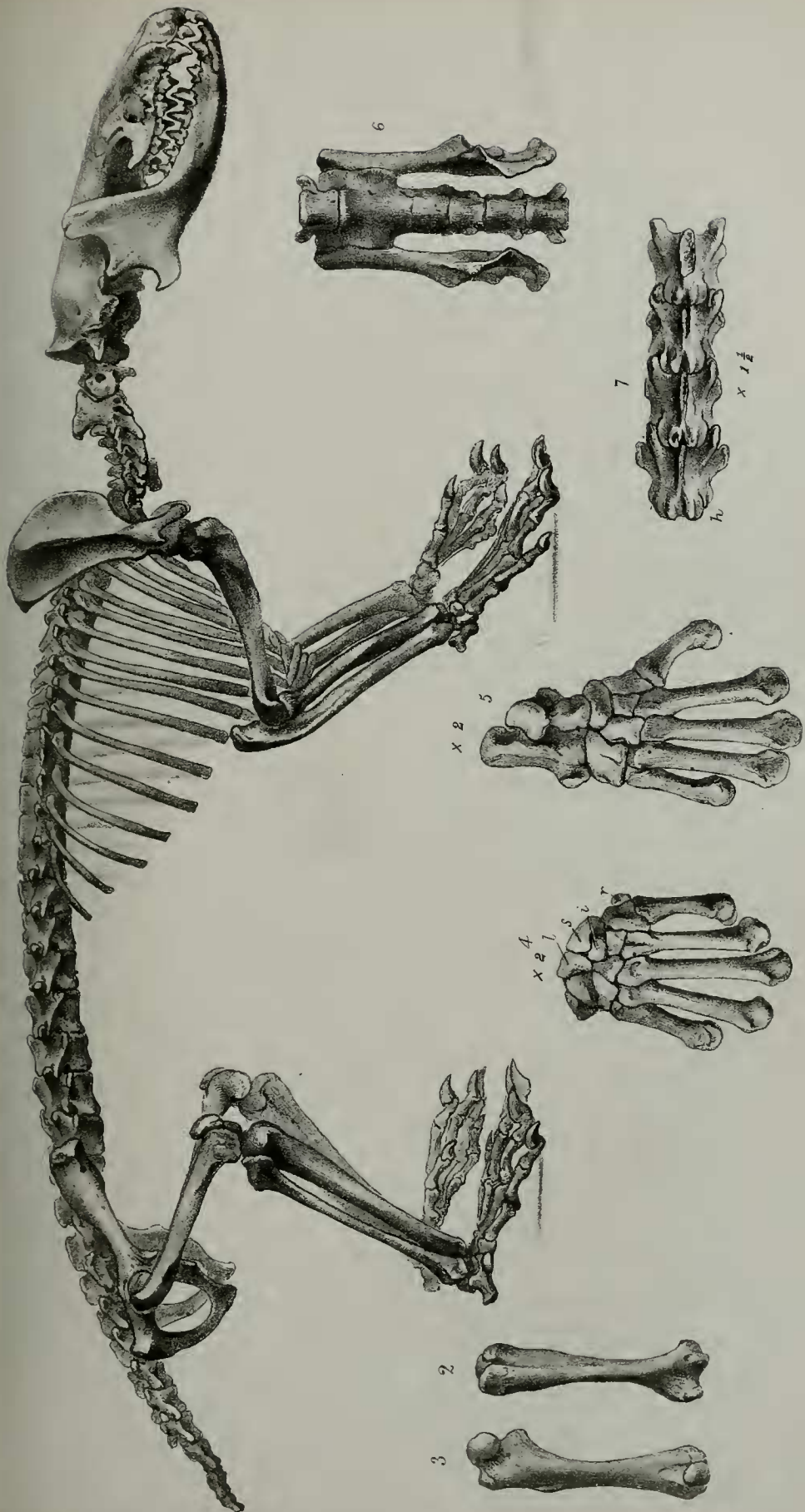
SOREX †, Linnæus.

I. $\frac{4-4}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{2-2}{1-1}$, M. $\frac{3-3}{3-3}$, = 32
 or I. $\frac{3-3}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{2-2}{1-1}$, M. $\frac{3-3}{3-3}$, = 30
 or I. $\frac{3-3}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{1-1}{1-1}$, M. $\frac{3-3}{3-3}$, = 24
 or I. $\frac{2-2}{1-1}$, C. $\frac{1-1}{1-1}$, P.M. $\frac{1-1}{1-1}$, M. $\frac{2-3}{3-3}$.

Cranium broad behind, tapering forwards; greatest breadth behind the glenoid surfaces; no postorbital process; occiput sloping much forwards; no pterygoid fossa; no zygoma; pterygoid region not inflated; mesopterygoid fossa ending posteriorly in no excavation of the *basis cranii*; tympanic a mere ring, not forming a bulla; no alisphenoid canal; a large aperture on each side of the base of the skull; large and anteroverted postglenoid processes; foramen rotundum and sphenoidal fissure represented by one opening; infraorbital foramen considerable, limited above by a thick bar of bone; inside of ascending ramus of mandible with a peculiar and deep excavation; articular surface of condyle looking backwards; angle very attenuated; first incisor much larger than the others, and always with two cusps; upper canine always smaller than the smallest upper

* Temminck, 'Fauna Japon.' i. p. 22, tab. iv. figs. 6-11; Wagner, Schreber, Suppl. v. p. 569; Spencer F. Baird, 'Mammals of America,' p. 76, pl. xxviii.

† De Blainville, 'Insectivores,' pls. ii., v., and x.; F. Cuvier, 'Dents des Mammifères,' no. xx.; Owen, 'Odontography,' pl. ex. fig. 4; Duvernoy, Magasin de Zoologie, 1842; Wagner, Schreb. Suppl. i. p. 47, v. pp. 539 and 802; Dr. E. Brandt, Russian Memoir of 1865, before referred to; Spencer F. Baird, 'Mammals of America,' pp. 7-56.



M. & N. Hanhart. imp.

ERICULUS NIGRESCENS

Westley lith.

incisor; upper molars with two triangular prisms; lower incisor very elongated; lower canine smallest tooth of mandible. Thirteen to fifteen dorsal vertebræ; five or six lumbar vertebræ; large cervical hypapophyses; no lumbar hypapophysial ossicles; well-marked hyperapophyses; manubrium broad, but not keeled; clavicle small and slender, not joining humerus; scapula short and broad; a bifurcating acromion process; generally a supracondyloid foramen in humerus; radius and ulna distinct; no sickle-shaped bone or os intermedium in carpus; ultimate phalanges not bifurcating; pelvis narrow, symphysis widely open; femur with a third trochanter; tibia and fibula confluent below; five digits to each extremity; no cæcum.

Hab. The Old World, and North America.

DESCRIPTION OF PLATE V.

Fig. 1. Skeleton of *Ericulus*, slightly less than the natural size.

2. Right humerus, seen in front.

3. Right femur, seen in front.

4. Right carpus and metacarpus, twice the natural size: *i*, os intermedium; *l*, lunare; *r*, radial sesamoid ossicle; *s*, scaphoides.

5. Right tarsus and metatarsus, twice the natural size.

6. Pelvis seen on its abdominal side, showing the separation of the pubic bones.

7. Four lumbar vertebræ, once and a half the natural size: *h*, hyperapophysis.

5. Descriptions of some new Species of Exotic Lepidoptera.

By ARTHUR GARDINER BUTLER, F.L.S., F.Z.S., &c.

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Genus AMAURIS, Hübner.

AMAURIS INFERNA, n. sp.

Front wings above as in *A. egialea*, but the two large central hyaline patches wider apart, and the two central spots of the oblique subapical series placed as in *A. ccheria*. Hind wings above and below almost as in *A. hecate*, but the shape of *A. damocles*. Front wings below with paler apical area; three white points at centre of outer margin.

Expanse of wings 3 inches $6\frac{1}{2}$ lines.

Hab. West Africa.

Coll. W. W. Saunders.

Genus DANAIS, Latreille.

DANAIS INO, n. sp.

Front wings as in *D. limniace*, but with only three small spots in the oblique series beyond the cell; the interno-basal streaks united in the middle. Hind wings almost as in *D. choaspes*; no discoidal black streak, but the basal patch between median and submedian